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TIDAL RESEARCHES.

Manual of Tides. Part V., Currents, Shallow-water Tides, Meteorological Tides, and Miscellaneous Matters. By Rollin A. Harris. Appendix No. 6: Report for 1907 of U.S. Coast and Geodetic Survey. Pp. 231–545. (Washington: Government Printing Office, 1908.)

THE author is to be congratulated on having brought to completion in the present volume a full and exhaustive study of existing knowledge relating to tides and tidal phenomena, previous instalments of which have appeared in similar form from time to time since 1894. The subject-matter dealt with is of a miscellaneous character, summarising those parts of the subject which could not be previously introduced without undue diversions.

The early chapters deal with the nature of the horizontal flow in steady streams or pipes, and seek to establish simple laws governing the action of friction in such streams. Various formulæ are derived or quoted which appear to accord well with the results of observation, and in which for the most part the action of the cross-eddies set up is found to be well represented by a term proportional to the square of the velocity of flow of the main current.

In applying these results to tidal phenomena, doubtless the direct action of viscosity is insignificant, and it is through the medium of such cross-eddies that friction is chiefly effective. If, however, this is the case, it would appear that the sensible effects of friction in modifying ocean tides would be localised in those regions where the configuration of the land or of the ocean bed gives rise to a magnification of the tidal flow large enough to be accompanied by such eddies, and that the principal phenomena of the tides in the open ocean will suffer practically no disturbance from frictional causes other than those which may be attributed to pure viscosity. We are thus unable to accept the author's conclusion, arrived at in the second chapter, as to the paramount effects of friction in determining the phases of ocean tides, a conclusion based on wholly unwarranted assumptions as to the quantitative effects of friction (*e.g.* "Suppose $\mu'=\frac{1}{2}$," p. 281), and, further, on an almost complete disregard of its laws of action as exemplified in the preceding chapter. The author, in fact, reverts to the analogue of the simple pendulum subject to purely viscous dissipation.

The conclusions, as we have elsewhere pointed out, are of vital importance[1] for the establishment of a theory of the tides put forward by the author in previous volumes which has not proved acceptable to ourselves, and, in our opinion, has vitiated much of the otherwise excellent work presented. Fortunately, the influence of this defective theory does not appear to extend further into the present volume, which contains much for which students of the tides, whether from a practical or a theoretical aspect, will be grateful.

In the theory of river tides the author follows Airy's treatment, which, while admittedly inadequate, serves to elucidate some of the more pronounced phenomena indicated by observation, and draws interesting conclusions with regard to the form and dimensions of estuaries.

The chapters relating to the distribution of tidal currents in various phases throughout the world constitute perhaps the most important contribution contained in the present volume. Besides giving a comprehensive summary, amply illustrated by diagrams, from all available records, the author has included much material dependent on observational data specially worked up for the present publication.

Among other matters dealt with, we may refer to the subject of seiche oscillations in lakes, the general circulatory system of the ocean, and many matters which will prove of interest to marine engineers.

In relation to a work where so much is praiseworthy, it is with reluctance that we have felt it again necessary to emphasise these points on which we differ from the author. Were the work addressed to mathematicians alone, this would not have been considered necessary, but a word of warning seems to be desirable to a large class of readers to whom it will appeal who, without following out the intricate mathematics involved, might otherwise be disposed to accept the results as authoritative. The work as a whole can scarcely fail to stimulate further researches into the more recondite problems connected with tidal phenomena.

S. S. H.

THE MORPHOLOGY OF ASIA.

The Face of the Earth. Vol. iii. By E. Suess. Translated by H. B. C. Sollas. Pp. vii+400; 7 plates, 23 figures. (Oxford: Clarendon Press, 1908.)

THE Oxford translation of the third volume of Suess's great geomorphology will be welcomed as warmly as its predecessors, though this part of his work is perhaps of less educational value and a smaller proportion of it interesting to general readers. Most of this volume is occupied by a detailed account of the stratigraphy of central and northern Asia. Much of the literature is so inaccessible that Prof. Suess's summary of the researches of the Russian surveyors will be of permanent value as a work of reference, and as he interprets and correlates the facts with his usual genius, the work is of the highest value as an original contribution to the tectonic geology of Asia. It is accompanied by a most valuable map of the structural geography of Central Asia.

The main thesis of this volume is Suess's statement of the essential structure of Asia and of its relations to Europe. He maintains the fundamental unity of Eurasia, and shows that it has been built up, around, or upon a vast sheet of ancient rocks, which form the Russian platform of Poland and south-western Russia, and most of Scotland and Scandinavia; the old rocks are buried beneath recent

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[1] NATURE, vol. lxxiii., p. 249. "Of course it may be contended that in the case of the tides the conditions necessary to render friction the controlling factor exist, but this contention is nowhere put forward explicitly by the author, and we are of opinion that it could not be substantiated."

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deposits in Western Siberia, but they reappear and form the surface of wide areas in central and eastern Siberia. This northern section of Eurasia forms Prof. Suess's primitive "Scheitel." It forms the foundation of Asia, and is bounded along its southern edge by concurrent mountain chains. The Ural mountains might be considered the western member of this peripheral series, but Suess regards it as a mountain line lying on this continental block which extends beyond them into western Europe; and he describes the Variscan Mountains of southern Germany and the Armorican Mountains, the worn down fragments of which form the hills of Belgium, Brittany, Devonshire, Cornwall, and southern Ireland, as the westernmost preserved parts of the marginal chains. It is, therefore, obvious from the broken ends of the Armorican Mountains that Eurasia must once have extended far westward into the Atlantic. Scotland and Scandinavia, however, are now the westernmost portions of this ancient continent. Prof. Suess briefly re-describes them, in reference to the great overthrusts that have been demonstrated during the past twenty-five years; and he considers why the overthrusting was westward in Scotland and eastward in Scandinavia. This section of the book even now requires revision, since Björlykke's monograph shows that Scandinavian opinion is not as unanimous as to the existence of the overthrusting as is represented, while the trend of opinion in Scotland for some years past has been against the view that the Scottish schists include altered Silurian rocks.

The second fundamental element in the structure of Eurasia was the long inland sea, the Tethys, that once separated northern Eurasia from the lands to the south. The Tethys is still represented in the western area by the Mediterranean; but in Asia it has been drained by uplift.

The third constituent of Eurasia is the fragments of Gondwanaland left in the Asiatic peninsulas. The union of the ancient continent to the north with the southern peninsulas by the disappearance of the eastern Tethys has formed the existing continent of Asia.

Even more care has been taken over the translation of this volume than of its two predecessors, and the accurate translation by Dr. Hertha Sollas has been revised by a group of distinguished geologists as a tribute of respect for Prof. Suess. The whole was then revised by Prof. Sollas. The French translation of this volume has the advantages of a fuller series of maps and sections which M. de Margerie has added to the rather scanty series supplied with the original; and the geographical terms in its sections are translated. A student might easily be confused by seeing Wasserschiede, Pass, and place-names in German transliterations all on the same section. It would have been an advantage to English-speaking students if the proper names had been given in English instead of in German forms, as it is sometimes difficult to identify them in British atlases or indexes. With this mass of foreign names occasional misprints are inevitable; thus, on p. 393, Sjörgen appears instead of Sjögren, and the Ekne schists are said to be possibly of Devonian instead of Caledonian age.

British geologists will be so grateful for this scholarly translation that they will be little disposed to criticise the rendering of Suess's geological terms; but it would be convenient if the original term were sometimes, as in the French translation, given in a footnote. Thus what Suess calls the "Scheitel" is translated the vertex, a term of doubtful suitability for an area extending from Scotland to eastern Siberia and from the Arctic Ocean to the Black Sea. Occasionally we find the other extreme and a German word retained where there appears to be an established English equivalent. Thus we read of a Garbenschist as if that were an accepted English petrological term.

The translation of the next volume is promised at the same time as the publication of the German and French editions, and as in it we may expect the general summary of Prof. Suess's conclusions, it will be eagerly awaited. J. W. G.

INFANTILISM.

On Infantilism from Chronic Intestinal Infection, characterised by the Overgrowth and Persistence of Flora of the Nursling Period. By Prof. C. A. Herter. Pp. v+118. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1908.) Price 4*s*. net.

IN a monograph of a hundred odd pages, the author presents a detailed study of five cases of severe nutritional disorder occurring in children. He regards them as typical examples of a distinct pathological condition, which he calls intestinal infantilism. He claims that this is a definite disease, distinct from, although sometimes associated with, other nutritional disorders, such as rickets, anæmia, marasmus, &c.

The patients were children between the ages of four and seven. They were all healthy at birth and during infancy, but in the second or third year of life they developed symptoms of intestinal disturbance, accompanied by failure of nutrition, which culminated in a state of complete arrest of physical growth for periods of months or years.

When they came under observation, a year or more after the onset of symptoms, these patients exhibited a striking clinical picture. Children of five, seven, or eight years of age weighed less than normal children of two. A boy (case 1), at the age of eight, weighed 31 lb., his development having been arrested since the age of three. Associated with their physical condition, the patients showed a chronic and very marked degree of muscular fatigue, a moderate grade of anæmia, and in some of the cases slight rickets. Their mental powers were retained to a very great extent, although naturally they were backward in comparison with normal children who were able to play games and to go to school.

The disturbance of intestinal function was shown by absolute intolerance of carbohydrates and great difficulty in the digestion of fats and earthy salts. The appetite remained ravenous, but the patients were unable to digest or assimilate food. The stools were

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